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the Precambrian, the recognizable land floras begin in the Devonian. But the great expanses of Devonian rock are for the main part beyond the reach, knowledge, and experience of the paleobotanist. Away to the Canadian Northwest and extending far into Alaska, the main Devonian mass stretches for 2,000 miles through the remotest region of the continent. Thence scarcely a plant has come. Far or near, no one goes into the Devonian field for plants, and the "finds" are apt to be neglected year after year. Although the world's first great forests appear in the Devonian, from all North America not 200 species of Devonian plants could be named, and those mostly of little satisfactory definition.

Inasmuch as Devonian plant materials must long fail to bulk up as a workable assemblage without some initial and better coordinated attention, I wish the invertebrate paleontologists and geologists who have data would supply them to me or to others interested, in the form of brief memoranda, or promptly publish the same. It should shortly be possible to see Devonian paleobotany on a better basis. Meanwhile it would be especially gratifying if some attention could be given to the following inquiries:

- (1) Which are the main shale or other sections where Devonian plants have been seen?
- (2) Are there good Psilophyton localities,—(a) where stems are petrified, (b) well carbonized?
- (3) What North American localities of the lower Devonian yield silicified stems large or small? The British geologists cite the Cordaite, *Paleopitys milleri* of the old Red.
- (4) Are there any North American Devonian cherts containing stems comparable to *Rhynia*, the most primitive of vascular plants, as occurring in the siliceous cherts of Aberdeenshire, Scotland?
- (5) Are there any well marked seeds in the Indiana Black shale, the Genesee shale, the Waverleyan? Are there any typical pteridospermous, or gymnospermous seeds in the North American Devonian at all?

The enormous extent of parallelism in the lines of plant descent, and the exceedingly small percentage of known forms in pre-Carboniferous rocks, give to every discovery of plants in the Devonian a high value. It is

to-day patent that better plant phylogenies much depend on the closest attention to chronology, and especially on new discoveries in the Devonian.

I should state that it is not my purpose to take up the subject of Devonian plants but to help others to do so, as I am persuaded that much material of value is being lost, or too long unnoted. Is it not grievous to admit that in the past twenty-five years, contributions to Devonian paleobotany have been so lacking from North America? There is for the Waverleyan at the close of Devonian time the very fine contribution of Scott and Jeffrey. And from the Indiana Black shale there is the fine Cordaite *Callixylon Oweni* of Elkins and Wieland. There the record of publication about closes.

But what possibilities of discovery there must be in the rocks that yield such a striking forest type as the "Naples tree," *Protolepidodendron*, interestingly restored at the State Hall at Albany! The great dearth of knowledge of the Devonian plant front is due to the failure to get the evidence in the field; although it is admitted that here discoveries and collection are difficult. It is possible to search given Devonian horizons for invertebrate material with success, because occurrences have been sought out and diligently described, the continent over, for the past three or four score years. The impression thus grows upon us that with attention in kind, the Devonian plant record for the continent would soon be augmented, and that relative importance of scientific subjects asks such a result. Is the investigation of the Devonian to be carried on only in other countries? Can we make no such brilliant discoveries as those from the Devonian cherts of Aberdeenshire?

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THE EFFECT OF ALKALI ON THE DIGESTIBILITY OF CELLULOSIC MATERIALS

THE communication of Professor Lindsey on the above subject in your issue of February 3 is of considerable interest to students of cellulose chemistry inasmuch as it indicates the

possibility of converting waste material into valuable food products.

In view of the interesting results obtained in Germany during the recent war, on the action of alkalis on chopped straw, this matter is well worthy of a thorough study. In a recent lecture by the writer to the Syracuse Section of the American Chemical Society on "The rôle of alkali in the future development of the cattle food, cellulose, paper-pulp and liquid fuel industries," attention was drawn to the fact that experiments carried out at the behest of the German War Office show that by the simple process of boiling chopped straw for three hours with a one per cent. solution of sodium carbonate a 75 per cent. yield of material is obtained, of which 75 per cent. is digestible, and this in spite of the relatively high lignin content. A full account of this work is to be found in the recent pamphlet by Hans Magnus entitled, "Theorie und Praxis der Strohaufschliessung," published by Paul Parey, Berlin, 1919. Further information and additional references are to be found in the recent work of Hans Pringsheim, "Die Polysaccharide," Berlin, 1919.

It would seem that the treatment with soda ash is peculiarly applicable to American conditions and offers to the individual farmer the possibility of obtaining a cheap cattle food from such waste materials as chopped straw, ground corn cobs, etc., by the use of a chemical product with which he is familiar and employing only the simplest type of machinery. The resulting material when mixed with molasses apparently yields a profitable and palatable cattle food of high nutritive value.

Lantern slides have been made of the various tables quoted in the pamphlet by Magnus, and the writer will be pleased to loan them to any one interested in lecturing on this subject.

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BUTYL ALCOHOL AS A REAGENT IN HISTOLOGY

PROFESSOR GRIFFIN'S article in *SCIENCE* for March 10, recommending the use of isopropyl and methyl alcohols for histological work, impels the writer to call attention to the prac-

tibility of using butyl alcohol, as recently suggested by Larbaud,¹ for similar purposes. Among the advantages claimed for this reagent are that it obviates difficulties due to the presence of slight amounts of water in so-called "absolute" ethyl alcohol, and that it does away with the contraction and hardening due to xylol, since butyl alcohol is a solvent of paraffin and therefore takes the place of xylol or chloroform as well as of the higher alcohols. As butyl alcohol does not mix readily with water, Larbaud recommends a mixture of equal parts of butyl and 95 per cent. ethyl alcohols in appropriate dilutions for the lower grades in the dehydrating series. There seems to be no *a priori* reason why a mixture of butyl and methyl alcohols would not serve equally well. The writer has used Larbaud's methods, with slight modifications, for the dehydration and infiltration of fungus tissues for cytological study, with entirely satisfactory results.

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GENETICS OF THE VIENNA WHITE RABBIT II.

IN *SCIENCE* for March 10, I described the genetics of a variety of white rabbit having colored eyes, which I supposed to be identical with the variety known in Europe as Vienna White. This variety I had synthesized by crossing albinos carrying the gene for yellow coat, with chinchillas, and I showed the white variety with colored eyes to be genetically a "yellow chinchilla." Since writing that article I have been able to obtain from Europe a pair of Vienna White rabbits and I find that, though they look like my synthetic white rabbits, they breed very differently. When crossed with yellow rabbits, they produce not *yellow* young, as my synthetic whites should do, but blue, black or gray young, according to the genetic constitution of the yellow parent, and these young are invariably *Dutch-marked*, pre-

¹ Larbaud, Mlle.: Nouvelle technique pour les inclusions et les préparations microscopiques des tissus végétaux et animaux. *Comptes. Rend. Ac. Sci. Paris*, 172: 1317-1319. 1921.